

Trend Study 27R-3-03

Study site name: John R. Flat Exlosure Outside .

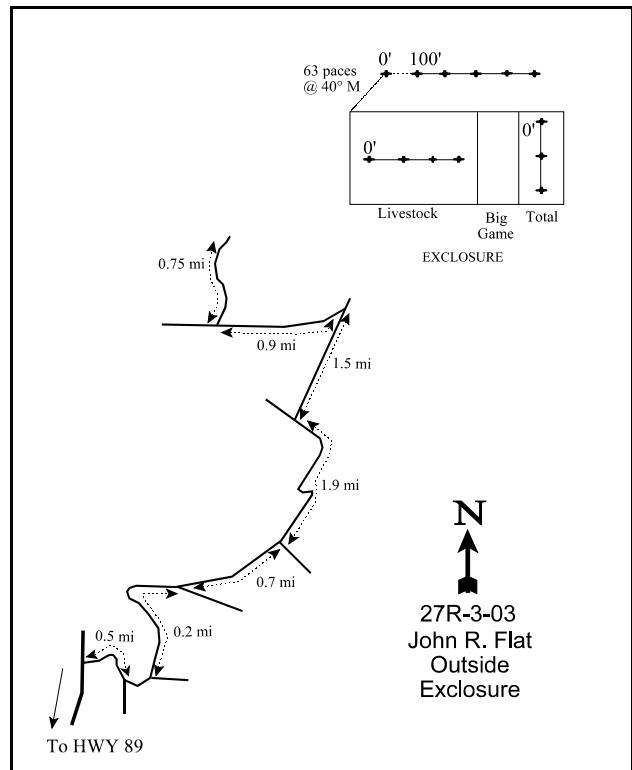
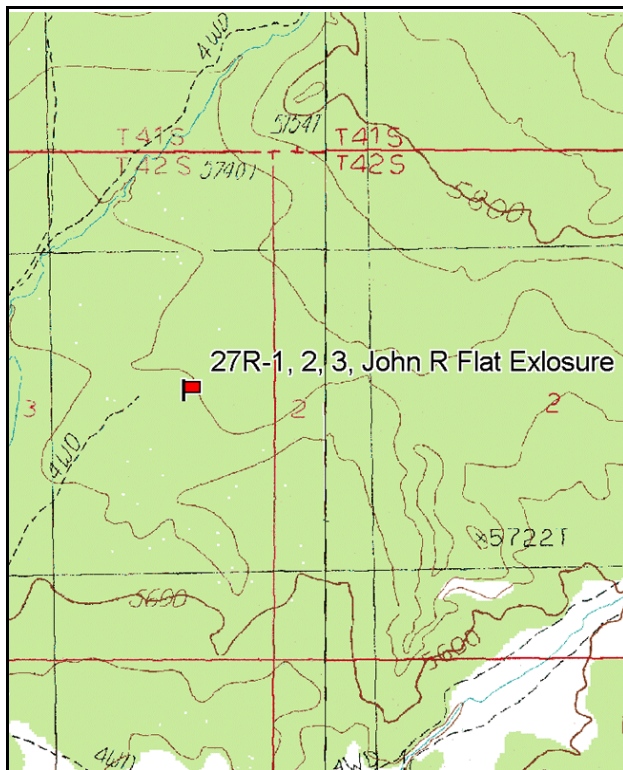
Vegetation type: P-J/ Big Sagebrush .

Compass bearing: frequency baseline 100 degrees magnetic.

Frequency belt placement: line 1(11 ft) , line 2(34 ft) , line 3(59 ft) , line 4(71 ft) , line 5(95 ft).

LOCATION DESCRIPTION

From Kanab, travel north on Highway 89 to the Kanab Creek turnoff. Turn right and go 2.9 miles to another turnoff (you will pass the Best Friends Animal Sanctuary). Turn right, crossing Kanab Creek, and go 0.5 miles to a fork. Stay left and continue approximately 100 feet to another fork. Stay left again and continue 0.2 miles to the next fork. Stay left and continue 0.7 miles to the next fork. Stay left again and travel 1.9 miles to another fork. Go right at this fork and go 1.5 miles to another fork. At this fork, turn left, cross the drainage, and go 0.9 miles to a fork. Go right at the fork for 0.75 miles to the exclosure. From the northwest corner of the exclosure, walk 63 paces at 40 degrees magnetic to the 0-foot stake of the baseline. The baseline runs at 100 degrees magnetic.



Map Name: White Tower

Diagrammatic Sketch

Township 42S , Range 6W , Section 3

GPS: NAD 27, UTM 12S 4116670 N, 366350 E

DISCUSSION

John R. Flat Exclosure Outside - Trend Study No. 27R-3

The John R. Flat exclosure is located on BLM administered land 10 miles north of Kanab, and about 1-2 miles south of the White Cliffs. In 1998, a 3-way comparison was established to compare the vegetative community between the different exclosure treatments (for additional information on the exclosure complex, refer to the discussion for study 27R-1). This study samples the vegetative community outside the exclosure complex. Aspect is to the west at 3-5%, and elevation is about 5,700 feet. A pellet group transect estimated 34 deer days use/acre (84 ddu/ha) in 1998 and 22 deer days use/acre (55 ddu/ha) in 2003.

Soils are sandy in texture and moderately acidic (pH of 5.6). Average effective rooting depth was estimated at 29 inches with an average soil temperature of 73°F at 18 inches in depth. Both potassium and phosphorous measurements were low, 3.2 ppm and 5.1 ppm respectively, and may limit plant development. Rocks and pavement are rarely encountered on the soil surface and were not encountered within the soil profile. Percent bare ground cover is high (61% in 1998 and 67% in 2003) and some soil pedestalling was noted around shrubs. The sandy soil texture and levelness of the site help minimize erosion.

Browse species provided 62% and 74% of the vegetative cover on the site in 1998 and 2003. Basin big sagebrush, sand sagebrush, and antelope bitterbrush are the most abundant browse species. Basin big sagebrush density was estimated at 1,540 plants/acre in 1998, declining to 900 in 2003. This population is highly decadent with no recruitment. Nearly 3/4 of the population had poor vigor in 2003, and dead plants were more abundant than live ones. Sand sagebrush numbered 380 plants/acre in 1998 and 460 in 2003. Most of the population was classified as mature, use was light, and decadence low at 22% in 2003. Antelope bitterbrush has an estimated density of about 250 plants/acre. The population was ½ young and ½ mature in 1998 with no decadence, light to moderate use, and normal vigor. In 2003, decadence increased to 23%, use was more heavy, and the young plants made up only 8% of the population. Point-center quarter data estimated 27 juniper trees/acre on the site in both 1998 and 2003. Other species scattered throughout the site include rubber rabbitbrush, skunkbush sumac, green ephedra, buckwheat, broom snakeweed, prickly pear cactus, and yucca.

The herbaceous understory is more abundant outside the exclosure complex compared to the livestock and total exclosures. Herbaceous species provided 5% cover on the site in 1998 and 2.5% in 2003. Grasses have low diversity with blue grama and sandhill muhly being the most common. Forbs are less abundant than grasses with nodding eriogonum having the highest frequency in 1998. With drought in 2003, nodding eriogonum was not sampled. Tarragon is the most abundant perennial forb on the site. Other perennial grasses include sand dropseed, Indian ricegrass, and purple three-awn.

1998 APPARENT TREND ASSESSMENT

Although some pedestalling was noted around shrubs, there is currently no serious erosion apparent on the site. The basin big sagebrush population appears to be declining at this time with 53% of the population classified as decadent, a dead to live ratio of 1:1, and no seedling plants encountered. The antelope bitterbrush population appears to be stable and healthy with no decadent or dead plants encountered. Utilization of antelope bitterbrush is light with all exhibiting good vigor. Herbaceous understory cover is poor and provides little protective ground cover.

2003 TREND ASSESSMENT

Trend for soil is slightly down with less protective cover on the surface. Vegetation and cryptogamic cover both declined and bare ground increased to 67%. The ratio of protective cover (vegetation, litter, and cryptogams) to bare soil is very low at 1.3:1. Trend for browse is down. Basin big sagebrush shows declines in density and reproduction, and increases in decadence and poor vigor. This population is in very poor

condition. Bitterbrush has a low but stable density, low decadence, and mostly good vigor. Use increased to a heavier level, but the population appears to be maintaining itself. Trend for the herbaceous understory is stable but in poor condition. Sum of nested frequency for perennial grasses and forbs slightly declined between 1998 and 2003, but with such low abundance to begin with, trend is still considered stable.

TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Management unit 27R, Study no: 3

Type	Species	Nested Frequency		Average Cover %	
		'98	'03	'98	'03
G	Aristida purpurea	-	5	-	.01
G	Bouteloua gracilis	37	29	1.95	.76
G	Muhlenbergia pungens	_a 8	_b 25	.78	1.27
G	Oryzopsis hymenoides	6	-	.06	.15
G	Sporobolus cryptandrus	20	4	.40	.01
G	Vulpia octoflora (a)	_b 25	_a -	.05	-
Total for Annual Grasses		25	0	0.05	0
Total for Perennial Grasses		71	63	3.21	2.22
Total for Grasses		96	63	3.25	2.22
F	Artemisia dracunculus	17	12	.77	.25
F	Chaenactis douglasii	_b 13	_a -	.36	-
F	Eriogonum cernuum (a)	_b 115	_a -	.53	-
F	Euphorbia parryi	6	-	.04	-
F	Gilia spp. (a)	5	-	.04	-
F	Machaeranthera canescens	-	-	.00	-
F	Oenothera albicaulis (a)	-	3	-	.01
F	Oenothera pallida	4	3	.04	.00
F	Sphaeralcea parvifolia	1	2	.00	.00
F	Unknown forb-annual (a)	-	5	-	.00
Total for Annual Forbs		120	8	0.57	0.01
Total for Perennial Forbs		41	17	1.22	0.25
Total for Forbs		161	25	1.79	0.27

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 27R, Study no: 3

Type	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia filifolia	15	19	.75	.65
B	Artemisia tridentata tridentata	54	32	3.83	3.05
B	Chrysothamnus nauseosus	9	8	.73	.58
B	Ephedra viridis	5	3	.58	.44
B	Eriogonum nummularae	2	4	.03	.00
B	Gutierrezia sarothrae	1	0	-	-
B	Juniperus osteosperma	0	1	.15	.38
B	Opuntia spp.	1	2	-	-
B	Purshia tridentata	11	10	2.19	1.91
Total for Browse		98	79	8.29	7.03

CANOPY COVER, LINE INTERCEPT --

Management unit 27R, Study no: 3

Species	Percent Cover	
	'98	'03
Artemisia filifolia	-	.91
Artemisia tridentata tridentata	-	1.61
Chrysothamnus nauseosus	-	.20
Ephedra viridis	-	.93
Juniperus osteosperma	2.40	3.40
Purshia tridentata	-	2.61

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27R, Study no: 3

Species	Average leader growth (in)
	'03
Artemisia tridentata tridentata	2.2
Purshia tridentata	3.4

POINT-QUARTER TREE DATA --

Management unit 27R, Study no: 3

Species	Trees per Acre	
	'98	'03
Juniperus osteosperma	27	27

Average diameter (in)	
'98	'03
10.4	13.2

BASIC COVER --

Management unit 27R, Study no: 3

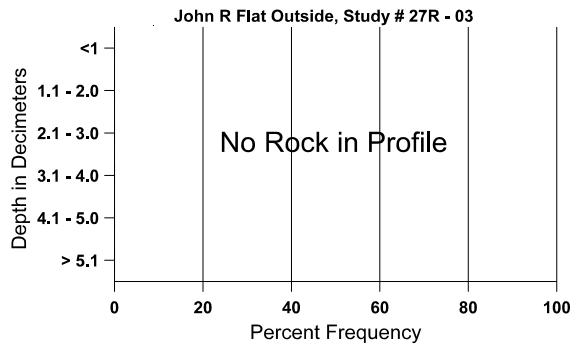
Cover Type	Average Cover %	
	'98	'03
Vegetation	14.82	9.83
Rock	.00	0
Pavement	.00	.03
Litter	28.68	27.57
Cryptogams	6.28	1.74
Bare Ground	60.68	66.54

SOIL ANALYSIS DATA --

Management unit 27R, Study no: 3, Study Name: John R. Flat Outside

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
29.4	72.6 (17.7)	5.6	92.2	2.0	5.8	0.5	5.1	3.2	0.2

Stoniness Index



PELLET GROUP DATA --

Management unit 27R, Study no: 3

Type	Quadrat Frequency		Days use per acre (ha)	
	'98	'03	'98	'03
Rabbit	17	15	-	-
Cow	-	-	-	1 (4)
Elk	1	-	-	-
Deer	33	23	33 (82)	22 (55)

BROWSE CHARACTERISTICS --
Management unit 27R, Study no: 3

		Age class distribution (plants per acre)					Utilization				
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Artemisia filifolia</i>											
98	380	40	40	300	40	20	0	0	11	5	22/22
03	460	-	40	320	100	80	0	0	22	4	22/26
<i>Artemisia tridentata tridentata</i>											
98	1540	-	160	560	820	1480	45	9	53	19	27/35
03	900	-	-	100	800	1100	9	0	89	73	19/24
<i>Chrysothamnus nauseosus</i>											
98	200	-	20	140	40	80	0	0	20	0	29/41
03	180	-	20	100	60	40	0	0	33	0	29/36
<i>Ephedra viridis</i>											
98	160	40	100	60	-	-	75	0	0	0	44/63
03	240	-	40	180	20	-	17	0	8	8	31/37
<i>Eriogonum nummularre</i>											
98	60	-	20	40	-	-	0	0	-	0	13/22
03	80	-	40	40	-	-	0	50	-	0	11/14
<i>Gutierrezia sarothrae</i>											
98	20	-	-	20	-	-	0	0	-	0	6/8
03	0	-	-	-	-	20	0	0	-	0	9/18
<i>Juniperus osteosperma</i>											
98	0	-	-	-	-	-	0	0	-	0	-/-
03	20	-	20	-	-	-	0	0	-	0	-/-
<i>Opuntia spp.</i>											
98	20	-	-	20	-	-	0	0	0	0	5/13
03	40	-	-	-	40	-	0	0	100	50	-/-
<i>Purshia tridentata</i>											
98	240	-	120	120	-	-	25	0	0	0	40/65
03	260	-	20	180	60	-	8	54	23	8	27/46
<i>Rhus trilobata</i>											
98	0	-	-	-	-	-	0	0	-	0	18/30
03	0	-	-	-	-	-	0	0	-	0	13/29
<i>Ribes spp.</i>											
98	0	-	-	-	-	-	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	22/59
<i>Yucca spp.</i>											
98	0	-	-	-	-	-	0	0	-	0	30/25
03	0	-	-	-	-	-	0	0	-	0	17/36

John R. Flat Exclosure Comparison Summary

Ground cover characteristics differ considerably outside and within the exclosures. Bare ground cover was highest outside of the exclosure in both 1998 and 2003 at 61% and 67% respectively, compared to the livestock and total exclosures where bare ground was estimated between 42% and 49%. Vegetation cover was nearly twice as high inside the exclosures compared to outside in both 1998 and 2003. Litter cover was lowest outside the exclosures in both 1998 and 2003 at just under 30%, while the livestock and total exclosures had litter values ranging between 42%-50%.

As was reported in 1998, soil characteristics are very similar between all treatments. Soils are moderately deep with very sandy textures and understandably low organic matter content. Soils are moderate to strongly acidic across all exclosure types. Very little erosion is occurring on any of the sites due to the high infiltration rates of these very sandy soils and the levelness of the site. Phosphorous and potassium levels are low for all sites and may limit plant development.

The browse component is critical at John R. Flat as this area is critical winter range for the deer herds that inhabit the Paunsaugunt unit. Basin big sagebrush and antelope bitterbrush are the key species in the area. In 1998, the density of basin big sagebrush was highest in the livestock exclosure (4,420 plants/acre), intermediate outside the exclosure (1,540 plants/acre), and lowest in the total exclosure (920 plants/acre). Sagebrush density declined in all 3 treatments in 2003. Much of the decline was due to the loss of a moderate to high proportion of young in 1998 which virtually disappeared in 2003 with drought conditions. In 2003, the number of dead sagebrush was almost as numerous as the live plants in all 3 exclosures. Percent decadence was high outside the exclosure in 1998 at 53%, but much lower in the total (22%) and livestock exclosures (14%). All 3 treatments showed large increases in decadence for sagebrush in 2003 with the livestock and outside treatments having extreme levels of 93% and 89% respectively. The total exclosure had moderately high decadence at 47%. The proportion of sagebrush exhibiting poor vigor characteristics showed the same pattern as decadence with the highest levels being found in the livestock exclosure and outside, and the lowest level occurring in the total exclosure. Bitterbrush density remained relatively stable between 1998 and 2003 in all 3 treatments. However, the key browse parameters of young recruitment and decadence showed important changes. As with basin big sagebrush, young bitterbrush plants declined in all 3 treatments, and percent decadence increased. The decadence levels for bitterbrush were not as extreme as with basin big sagebrush, but still too high at over 40% in the total and livestock exclosures. Bitterbrush vigor was generally good in 1998 and 2003 on all sites.

It was noted in the 1998 summary comparison that sagebrush are more susceptible to winter injury than any other shrub species occurring on the site. This injury is presumably caused by freezing due to a lack of sufficient cold hardiness and/or winter drought or dessication (Nelson and Tiernan 1983). During mild winters, sagebrush can break dormancy during the middle of the winter and begin growth too early in the year. By doing so, sagebrush plants become susceptible to dessication and crown death if temperatures become very cold for any substantial length of time or there is little moisture within the soil profile especially within these deep sandy soils. This effect could be aggravated by use on the outside of the exclosure as well as inside the livestock exclosure, causing even higher death rates and higher rates of decadency.

The drought cycle that included the 2003 sampling year probably has the biggest effect on overall browse conditions. There is some evidence in 2003 that utilization may be having an additive negative effect inside the livestock exclosure as well as outside the exclosures, as the highest levels of poor vigor and decadence occurred on these 2 treatments. However, use is most likely not the primary driving force behind deteriorating sagebrush health as utilization of sagebrush was mostly light to moderate in 1998 and 2003.

Herbaceous vegetation at John R. Flat is depleted. The understories on these sites have very low production and diversity. Interestingly, the highest cover and frequency values for herbaceous species occurred outside the exclosures in both 1998 and 2003. But even on this treatment, herbaceous species were low providing only 5% and 2.5% average cover in 1998 and 2003 respectively. Total sum of nested frequency of perennial

grasses and forbs was 112 in 1998 and 80 in 2003. The understory communities inside the livestock and total exclosures were almost nonexistent in both surveys, and a discussion here is futile. With so few herbaceous species, livestock will naturally turn to browsing on shrubs during the grazing season, and an increase in herbaceous species is highly unlikely unless restoration is an option.